LOW-LEVEL RADIOACTIVE WASTE MANAGEMENT IN CONNECTICUT – 1999

Prepared By

Connecticut Hazardous Waste Management Service
Low-Level Radioactive Waste Program
100 Constitution Plaza, 17th Floor
Hartford, Connecticut 06103-1702

Pursuant To

Connecticut General Statutes
Section 22a-163b

October, 2000

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Connecticut Hazardous Waste Management Service

The Connecticut Hazardous Waste Management Service is a non-regulatory, quasi-public agency with statutory responsibility to promote the appropriate management of hazardous waste and low-level radioactive waste generated in Connecticut

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List Of Acronyms

BWR..... boiling water reactor
CGS ..... Connecticut General Statutes
CHWMS..... Connecticut Hazardous Waste Management Service
DEP ..... Department of Environmental Protection
DOE..... Department of Energy
EPA ..... Environmental Protection Agency
LLRW..... low-level radioactive waste
NORM..... naturally-occurring radioactive material
NRC..... Nuclear Regulatory Commission
PWR ..... pressurized water reactor

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1. Introduction

The Connecticut Hazardous Waste Management Service (CHWMS) is required by Connecticut's low-level radioactive waste (LLRW) management facility development law[1] to undertake the following responsibilities:

- Prepare and revise, as necessary, a LLRW Management Plan for Connecticut;
- Select a site for a LLRW management facility;
- Select a management technology to be used at the site;
- Select a firm to obtain the necessary approvals for the facility and to develop and operate it; and,
- Serve as the custodial agency for the facility.

Effective July 1, 2000, South Carolina joined Connecticut and New Jersey as a member of the Northeast Interstate LLRW Management Compact, which has now become known as the Atlantic LLRW Management Compact. Connecticut and New Jersey had formed the Northeast LLRW Compact in 1986. In joining the Atlantic Compact, South Carolina volunteered to have the Barnwell LLRW disposal facility serve as the compact's LLRW disposal facility until all of the currently licensed nuclear power plants in the compact region are fully decommissioned. In addition to admitting South Carolina to the Compact, the Northeast Compact Commission revoked and rescinded its previous designation of Connecticut and New Jersey as host states for disposal facilities. The CHWMS is, therefore, no longer pursuing the development of a LLRW disposal facility in Connecticut.

As part of its LLRW management planning responsibility, since 1988 the CHWMS has reported annually on the generation and management of LLRW in Connecticut. These updates have been presented either as part of a LLRW management plan or as a separate document.

This report presents information on the generation and management of LLRW in Connecticut during 1999. The data presented here were compiled from annual reports submitted by LLRW generators to the Connecticut Department of Environmental Protection (DEP). Annual reports submitted by July 15, 2000 are included in this report. The CHWMS is responsible for the analysis of the data.

1.1 The Connecticut Hazardous Waste Management Service

The CHWMS is a non-regulatory, quasi-public agency established by Connecticut state law in 1983.[2] When originally established, the CHWMS was responsible for planning for and promoting the appropriate management of hazardous waste[3] generated in Connecticut. The CHWMS's

[1] *Connecticut General Statutes* (*CGS*) 22a-163 et seq.
[2] *CGS* 22a-134aa et seq.
[3] "Hazardous waste" is waste covered under the federal Resource Conservation and Recovery Act.

LLRW responsibilities were established by the Connecticut LLRW management facility development law enacted in 1987.[4]

The CHWMS is directed by an 11 member Board of Directors, 7 of whom are currently voting members.

- The Chairperson of the Board is appointed by the Governor, with the consent of both houses of the General Assembly. The Chairperson is selected at-large from Connecticut's citizens without geographic or economic sector constraints and serves at the pleasure of the Governor. The Chairperson also serves as the Executive Officer of the CHWMS.

- The other six voting directors are appointed by the Governor for staggered four-year terms. One director must be appointed from each of Connecticut's six Congressional districts. Two of these directors must represent the public, two the business community and two the scientific community.

- The four non-voting directors represent the Office of Policy and Management and the Departments of Environmental Protection, Public Health and Transportation.

1.2 Low-Level Radioactive Waste

LLRW is defined in federal law[5] and state law[6] in two ways: first, by stating what it is not and, second, by stating what it is. LLRW **is not** spent fuel assemblies from commercial nuclear reactors, high-level radioactive waste[7] or uranium mining and milling wastes. LLRW **is** waste containing radioactive material that the U.S. Nuclear Regulatory Commission (NRC), consistent with existing law, classifies as LLRW.

LLRW includes a wide variety of materials that have a wide range of levels of radioactivity. It includes slightly radioactive items, such as protective clothing, paper towels and laboratory equipment, as well as some very radioactive items, such as materials used to purify reactor coolant in nuclear power plants and used equipment from inside nuclear reactors. LLRW is generated in the operation and maintenance of nuclear power plants, as well as by many public and private institutions (hospitals and universities), private research firms, industrial facilities and the military.

While federal law makes each state responsible for providing disposal capacity for LLRW generated in the state, states are not responsible for **all** LLRW generated within their borders. The federal government, specifically, the U.S. Department of Energy (DOE), is responsible for LLRW from the following sources and the following types:

- LLRW owned or generated by DOE;

- LLRW owned or generated by the U.S. Navy as a result of decommissioning Navy vessels;

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[4] *CGS* 22a-163 et seq.
[5] Low-Level Radioactive Waste Policy Amendments Act of 1985 (P.L. 99-240), Sec. 2(9)
[6] *CGS* 22a-163a(9)
[7] "High-level radioactive waste" is the residue from reprocessing spent fuel.

- LLRW owned or generated by the federal government as a result of any research, development, testing or production of nuclear weapons; and,

- Any other LLRW with concentrations of radionuclides that exceed the limits established by the NRC for waste that can be disposed of in a surface or near-surface disposal facility (i.e., "greater that Class C" LLRW).[8]

An additional form of waste which states are responsible for managing is "mixed waste". Mixed waste satisfies the definition of both LLRW and hazardous waste in federal law and regulations. Therefore, mixed waste is LLRW that is also chemically hazardous.

2. LLRW Generators in 1999

2.1 Inventory of Generators

There were 62 active and potential generators of LLRW in Connecticut in 1999. These generators are located in 33 towns throughout the state. Table 1 (pages 4 and 5) lists and identifies the 62 generators by town and generator category.[9] Figure 1 (page 6) shows the location of each generator.

Table 1 also indicates whether or not a generator:

- was storing LLRW on-site at the end of 1999,
- shipped LLRW off-site for management, including disposal, during 1999,
- disposed of LLRW during 1999, and/or
- anticipates disposing of LLRW in the next five years.

Of the 62 generators listed, 32 shipped LLRW off-site for management or to disposal in 1999 and comprise the active subset of generators. The active generators include 30 that shipped waste off-site for management in 1999 (10 of which did not ship waste to a disposal facility in 1999) and 22 that actually disposed of waste in 1999 (2 of which had waste arrive at a disposal facility in 1999, but did not ship waste off-site during the year; the waste that was disposed was shipped off-site by the generator in a previous year). The remaining 30 potential generators only stored LLRW on-site for future disposal and/or projected future generation of LLRW requiring disposal.

[8] Section 4.1 contains a discussion of waste classes.

[9] The generator categories are fuel fabrication, industrial, institutional, military, nuclear power plant and private research. The categories are described in Section 2.2.

TABLE 1: Connecticut LLRW Generators - 1999

Generator	Town	Category of Generator	Stored	Shipped Off-Site	Disposed	Projected Disposal
ABB Combustion Engineering Nuclear Products	Windsor	Fuel Fabrication	X			X
ABB Combustion Engineering Nuclear Services	Windsor	Industrial	X	X	X	X
Alexion Pharmaceuticals	New Haven	Private Research	X			X
Alpha Q, Inc.	Colchester	Industrial				X
Arch Chemicals, Inc.	Cheshire	Private Research	X	X		X
Bayer Corporation	West Haven	Private Research	X	X	X	X
Boehringer Ingelheim Pharmaceuticals	Ridgefield	Private Research	X	X	X	X
Bristol-Myers Squibb	Wallingford	Private Research		X	X	X
Budney Overhaul & Repair Ltd.	Berlin	Industrial	X			X
Clairol	Stamford	Private Research		X		X
Connecticut Agricultural Experiment Station	New Haven	Institutional	X			X
Connecticut College	New London	Institutional				X
Connecticut Yankee Atomic Power Co.	Haddam	Nuclear Power Plant	X	X	X	X
DeKalb Genetics Corp.	Stonington	Private Research				X
Diagnostic Radiology Associates	Waterbury	Institutional				X
Dianon Systems Inc.	Stratford	Institutional	X			
Eastern Connecticut State University	Windham	Institutional	X			X
Electric Boat Division, General Dynamics	Groton	Military		X	X	X
Electro-Methods Overhaul & Repair	South Windsor	Industrial		X	X	
Electro-Methods, Inc.	South Windsor	Industrial			X	
Fairfield University	Fairfield	Institutional	X			
Fischer Technology Inc.	Windsor	Industrial	X			X
FuelCell Energy Inc.	Danbury	Industrial		X	X	
Global Turbine Component Tech, LLC	South Windsor	Industrial		X		
Hamilton Sundstrand Division, United Technologies	Windsor Locks	Industrial				X
Hartford Hospital	Hartford	Institutional	X			
Honeywell Stratford Army Engine Plant	Stratford	Industrial				X
Institutes for Pharmaceutical Discovery, Inc.	Branford	Private Research	X			X
John B. Pierce Laboratory	New Haven	Institutional		X		X
Kodak S.I.S.	New Haven	Industrial	X			X
L&W Research, Inc.	West Haven	Private Research		X	X	
Metal Management Aerospace	Hartford	Industrial	X			

TABLE 1: (Continued)

Generator	Town	Category of Generator	Stored	Shipped Off-Site	Disposed	Projected Disposal
Millstone 1 Northeast Nuclear Power Co.	Waterford	Nuclear Power Plant	X	X	X	X
Millstone 2 Northeast Nuclear Power Co.	Waterford	Nuclear Power Plant	X	X	X	X
Millstone 3 Northeast Nuclear Power Co.	Waterford	Nuclear Power Plant		X	X	X
Neurogen Corporation	Branford	Private Research	X	X		X
ONSI	South Windsor	Industrial				X
Oread, Inc.	Farmington	Private Research				X
Packard BioScience Company	Meriden	Industrial				X
Pfizer Inc.	Groton	Private Research	X	X	X	X
Pratt & Whitney Division, United Technologies	East Hartford	Industrial		X	X	X
Protein Sciences Corporation	Meriden	Industrial		X		
Raytheon Optical Systems, Inc.	Danbury	Industrial		X	X	X
RSA Laboratories, Inc.	Hebron	Industrial	X	X	X	X
Schlumberger-Doll Research	Ridgefield	Private Research	X			
SibTech, Inc.	Newington	Private Research		X		X
Sikorsky Aircraft Division, United Technologies	Stratford	Industrial			X	
Silicon Valley Group	Wilton	Industrial	X			X
Trinity College	Hartford	Institutional	X			X
U.S. Army Connecticut National Guard	Windsor Locks	Military		X		X
U.S. Navy Hospital	Groton	Institutional				X
U.S. Navy Nuclear Propulsion	Groton	Military	X	X	X	X
Uniroyal Chemical Co.	Middlebury	Private Research		X	X	X
United States Surgical Corporation	North Haven	Private Research		X		
United Technologies Research Center	East Hartford	Industrial	X			X
University of Connecticut Environ. Health & Safety	Mansfield	Institutional	X	X	X	X
University of Connecticut Health Center	Farmington	Institutional	X	X	X	X
VA Connecticut Healthcare System	West Haven	Institutional	X			X
Vion Pharmaceuticals, Inc.	New Haven	Private Research	X			X
Wesleyan University	Middletown	Institutional	X			X
Yale University	New Haven	Institutional	X	X		X
Yale-New Haven Hospital	New Haven	Institutional				X
NUMBER OF GENERATORS			33	30	22	49

The volume of LLRW shipped off-site for management in 1999 (177,859 cubic feet) is by far the largest amount reported since the CHWMS began collecting data. This large amount is primarily attributable to decommissioning activities at the Connecticut Yankee nuclear power plant. Connecticut Yankee was responsible for 85.7% of the total amount shipped off-site.

TABLE 3: Historical Amounts Of LLRW Stored, Shipped Off-Site And Disposed

Year	Number of Generators Who Stored	Stored On-Site		Number of Generators Who Shipped	Shipped Off-Site		Disposed	
		Volume (CuFt)	Activity (Ci)		Volume (CuFt)	Activity (Ci)	Volume (CuFt)	Activity (Ci)
1987				26	65,514	23,886	45,914	23,886
1988				29	57,388	96,451	39,741	96,450
1989				33	69,065	21,884	49,092	21,884
1990				29	80,100	255,163	34,233	255,160
1991				39	97,765	3,579	48,871	3,586
1992				33	127,021	29,357	75,581	29,357
1993	26	3,309	<1	30	60,578	5,375	15,011	5,372
1994	40	6,101	36,117	51	109,900	887	19,338	888
1995	41	7,575	53,829	23	55,487	870	9,714	840
1996	42	7,745	52,555	40	61,801	3,107	11,770	3,088
1997	43	8,540	52,911	32	28,797	261	7,271	259
1998	39	13,083	52,450	34	50,888	258	11,664	258
1999	33	17,816	53,871	30	177,859	1,214	6,159	1,171

Table 4 (pages 12 and 13) provides the following for each LLRW generator:

- The amount of LLRW in on-site storage at the end of 1999;
- The amount of LLRW shipped off-site for management, including disposal, during 1999;
- The amount of LLRW actually disposed during 1999; and/or
- The annual average of the amount of LLRW projected to require disposal over the next five years (2000 – 2004).

Generators are listed by category.

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TABLE 4: LLRW Stored, Shipped Off-Site, Disposed And Projected For Disposal In 1999 - By Generator

Generator	Stored		Shipped Off-Site		Disposed		Average Annual Projection	
	Volume (CuFt)	Activity (Ci)	Volume (CuFt)	Activity (Ci)	Volume (CuFt)	Activity (Ci)	Volume (CuFt)	Activity (Ci)
FUEL FABRICATION								
ABB Combustion Engineering Nuc. Products	2,178.5	0.046					435.7	0.009
FUEL FABRICATION TOTAL	2,178.5	0.046	0.0	0.000	0.0	0.000	435.7	0.009
INDUSTRIAL								
ABB Combustion Engineering Nuc. Services	2,478.0	0.130	2,415.5	0.044	287.3	0.299	200.0	0.200
Alpha Q, Inc.							10.0	<0.001
Budney Overhaul & Repair Ltd.	390.0	0.010					190.0	0.004
Electro-Methods Overhaul & Repair			63.7	0.008	13.2	0.004		
Electro-Methods, Inc.					2.4	0.001		
Fischer Technology Inc.	0.5	0.117					0.4	0.011
FuelCell Energy Inc.			0.7	<0.001	0.7	<0.001		
Global Turbine Component Tech, LLC			14.6	<0.001				
Hamilton Sundstrand Div., United Technologies							<0.1	0.080
[illegible] Stratford Army Engine Plar							45.6	<0.001
Kodak S.I.S.	7.5	<0.001					1.5	<0.001
Metal Management Aerospace	4.4	<0.001						
ONSI							0.5	<0.001
Packard BioScience Company							5.6	<0.001
Pratt & Whitney Div., United Technologies			279.9	0.028	279.9	0.028	22.0	0.002
Protein Sciences Corporation			4.0	0.021				
Raytheon Optical Systems, Inc.			34.5	0.001	35.8	<0.001	70.0	0.001
RSA Laboratories, Inc.	2.0	<0.001	2.0	0.004	2.0	0.004	2.0	0.001
Sikorsky Aircraft Div., United Technologies					1.1	<0.001		
Silicon Valley Group	83.0	<0.001					1.0	<0.001
United Technologies Research Center	2.0	0.001					2.0	0.002
INDUSTRIAL TOTAL	2,967.4	0.258	2,814.9	0.106	622.4	0.336	550.6	0.301
INSTITUTIONAL								
Connecticut Agricultural Experiment Station	13.1	0.001					1.0	<0.001
Connecticut College							1.0	0.001
Diagnostic Radiology Associates							2.4	0.001
Dianon Systems Inc.	30.0	0.063						
Eastern Connecticut State University	6.9	<0.001					0.3	<0.001
Fairfield University	6.5	<0.001						
Hartford Hospital	7.5	0.001						
John B. Pierce Laboratory			5.0	0.001			5.0	0.005
Trinity College	1.0	<0.001					2.0	<0.001
U.S. Navy Hospital							4.0	<0.001
University of Connecticut Environ. H&S	2.7	0.136	63.7	0.641	32.9	0.037	25.0	0.075
University of Connecticut Health Center	395.0	0.391	654.6	0.071	24.2	0.026	4.2	0.021
VA Connecticut Healthcare System	37.5	<0.001					15.0	0.001
Wesleyan University	3.5	0.001					7.5	0.001
Yale University	1,606.0	0.811	1,144.4	3.279			980.0	0.960
Yale-New Haven Hospital							7.5	0.300
INSTITUTIONAL TOTAL	2,109.7	1.404	1,867.7	3.992	57.1	0.063	1,054.9	1.364

TABLE 4: (Continued)

Generator	Stored		Shipped Off-Site		Disposed		Average Annual Projection	
	Volume (CuFt)	Activity (Ci)	Volume (CuFt)	Activity (Ci)	Volume (CuFt)	Activity (Ci)	Volume (CuFt)	Activity (Ci)
MILITARY								
Electric Boat Division, General Dynamics			306.1	<0.001	300.8	<0.001	140.0	0.005
U.S. Army Connecticut National Guard			7.5	0.001			7.5	126.400
U.S. Navy Nuclear Propulsion	722.7	0.267	843.2	18.120	534.6	18.035	1,000.0	1.000
MILITARY TOTAL	722.7	0.267	1,156.8	18.121	835.4	18.035	1,147.5	127.405
NUCLEAR POWER PLANT								
Connecticut Yankee Atomic Power Co.	8,500.0	1,546.000	152,437.5	541.274	3,059.0	542.275	19,988.6	11,256.815
Millstone 1 Northeast Nuclear Power Co.	100.5	52,200.000	2,128.6	0.056	173.8	0.376	36,103.6	262.320
Millstone 2 Northeast Nuclear Power Co.	66.8	121.000	3,703.0	32.253	291.7	7.184	700.0	9.100
Millstone 3 Northeast Nuclear Power Co.			10,085.5	603.103	664.3	600.456	700.0	9.100
NUCLEAR POWER PLANT TOTAL	8,667.3	53,867.000	168,354.6	1,176.685	4,188.8	1,150.292	57,492.2	11,537.335
PRIVATE RESEARCH								
Alexion Pharmaceuticals	59.6	0.040					4.0	0.006
Arch Chemicals, Inc.	2.3	<0.001	0.1	<0.001			1.0	0.001
Bayer Corporation	163.8	0.025	816.6	0.094	95.1	0.052	66.0	0.050
Boehringer Ingelheim Pharmaceuticals	28.5	1.015	461.0	3.668	333.0	1.960	221.0	2.210
Bristol-Myers Squibb			397.0	0.229	23.4	0.428	25.0	0.500
Clairol			8.2	0.001			15.0	0.005
DeKalb Genetics Corp.							10.0	0.001
Institutes for Pharmaceutical Discovery, Inc.	0.1	<0.001					1.0	<0.001
L&W Research, Inc.			2.3	0.138	2.1	0.138		
Neurogen Corporation	378.7	0.039	307.7	0.036			400.0	0.050
Oread, Inc.							75.0	0.175
Pfizer Inc.	514.8	0.644	1,499.5	9.660	0.4	0.012	16.2	0.461
Schlumberger-Doll Research	0.5	<0.001						
SibTech, Inc.			2.0	1.550			2.0	1.000
Uniroyal Chemical Co.			129.0	0.035	1.7	0.002	68.0	0.062
United States Surgical Corporation			42.0	0.082				
Vion Pharmaceuticals, Inc.	22.5	<0.001					23.3	0.006
PRIVATE RESEARCH TOTAL	1,170.7	1.762	3,665.4	15.493	455.7	2.591	927.5	4.527
TOTAL	17,816.2	53,870.737	177,859.3	1,214.396	6,159.3	1,171.316	61,608.4	11,670.941

3.1 LLRW Stored On-Site

Prior to 1994, Connecticut's LLRW generators were able to dispose of most of their LLRW within a reasonable time after it was generated. Generators maintained only a small inventory of waste on-site from one year to another.

However, between July, 1994 and June, 1995, Connecticut generators, as well as generators in many other states, lost access to all full-service LLRW disposal facilities. On July 1, 1994, they began storing waste on-site indefinitely. By the end of 1994, 40 LLRW generators in 23 Connecticut towns had accumulated and were storing substantial quantities of LLRW.

In 1995, South Carolina enacted legislation that withdrew South Carolina from the Southeast LLRW Compact and re-opened the Barnwell LLRW disposal facility to LLRW from outside the Southeast LLRW Compact region effective July 1, 1995.[17] The State of South Carolina imposed additional surcharges for the right to dispose of LLRW at Barnwell and collected substantial revenues for public education.

Although many Connecticut generators resumed LLRW shipments to the Barnwell facility, others continue to store waste on-site. Reasons cited for this practice are the high costs of disposing of LLRW at the Barnwell facility and decreased amounts of LLRW generated, which results in a longer time to collect enough LLRW to justify an off-site shipment.

As Table 4 (pages 12 and 13) indicates, at the end of 1999, 33 generators were storing 17,816 cubic feet of LLRW containing 58,871 curies of radioactivity. The 33 generators consisted of 19 that only stored LLRW and 14 that stored waste in addition to shipping and/or disposing of it.

The amount of radioactivity in storage is significantly greater that the amounts that have been disposed in recent years. The radioactivity in the waste stored by Millstone 1 accounts for 96.9% of the total. The waste consists of control rod blades and other equipment that will be disposed as part of the decommissioning of Millstone 1.

3.2 Off-Site Shipment And Processing Of LLRW

When shipping LLRW off-site, generators can contract directly with a contract carrier, or they can hire a LLRW broker. Generally, a waste broker collects waste from several generators and consolidates it into a single full-truck shipment. In addition, brokers often provide waste classification services, prepare the manifest for the shipment and package the waste.

After being shipped off-site from generator facilities, LLRW is frequently processed to reduce its volume prior to disposal and/or to achieve a more stable waste form for disposal.[18] The services provided to LLRW generators by the processors include incineration, steam reforming, supercompaction, shredding, decontamination, and metal melting.

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[17] Effective July 1, 2000, South Carolina became a member of the Atlantic LLRW Compact, formerly known as the Northeast LLRW Compact. The other members of the Compact are Connecticut and New Jersey.

[18] It is the policy of the State of Connecticut to encourage generators to develop and implement new on-site LLRW and mixed waste volume reduction and stabilization practices and to use, to the extent possible, off-site LLRW and mixed waste treatment facilities.

The following are the brokers and processors used by Connecticut LLRW generators in 1999:

American Ecology Recycle Center, Inc., Oak Ridge, TN
ATG Inc., Oak Ridge, TN and Richland, WA
Chem-Nuclear Systems, LLC, Barnwell, SC
Diversified Scientific Services, Inc. (DSSI), Kingston, TN
Environmental Services, Inc., South Windsor, CT
Frank W. Hake, Inc., Oak Ridge, TN
GTS Duratek Corp., Oak Ridge, TN
Manufacturing Sciences Corp., Oak Ridge, TN
NDL Organization, Peekskill, NY
NSSI/Recovery Services, Inc., Houston, TX
Perma-Fix of Florida, Inc., Gainesville, FL
Philotechnics Ltd., Oak Ridge, TN
Radiac Research Corporation, Brooklyn, NY
Teledyne Isotopes, Inc., Westwood, NJ

As indicated in Table 4 (pages 12 and 13), in 1999 30 LLRW generators shipped 177,859 cubic feet of waste containing 1,214 curies off-site for management, including disposal. LLRW from an additional two generators that was shipped in previous years was disposed in 1999.

All of the 32 generators who shipped and/or disposed of LLRW shipped some or all of their waste by way of brokers and processors. The 32 generators shipped 176,073 cubic feet of LLRW containing 109 curies to brokers and processors. Connecticut Yankee was responsible for 86.6% of this volume. The waste from Connecticut Yankee results from decommissioning activities at the facility.

The brokers and processors, in turn, shipped 4,373 cubic feet of LLRW containing 66 curies to disposal facilities. This is a 97.5% decrease in waste volume through processing.[19] Figure 2 (page 16) illustrates the paths that LLRW traveled from generator facilities to disposal sites during 1999 and the amount that followed each path.

3.3 LLRW Disposed

As indicated in Table 4 (pages 12 and 13), 22 generators disposed of 6,159 cubic feet of LLRW containing 1,171 curies in 1999. Ten of the generators who shipped LLRW off-site for management in 1999 did not have any waste disposed during the year. On the other hand, two of the generators who had waste disposed in 1999 did not ship any waste off-site during the year. The waste was shipped off-site in previous years.

[19] This volume reduction calculation does not take into consideration the fact that the amount shipped to disposal by processors and brokers in 1999 includes some waste held from previous years, or that some waste shipped off-site for management in 1999 was held by processors and brokers at year's end.

FIGURE 2: Paths To Disposal - 1999

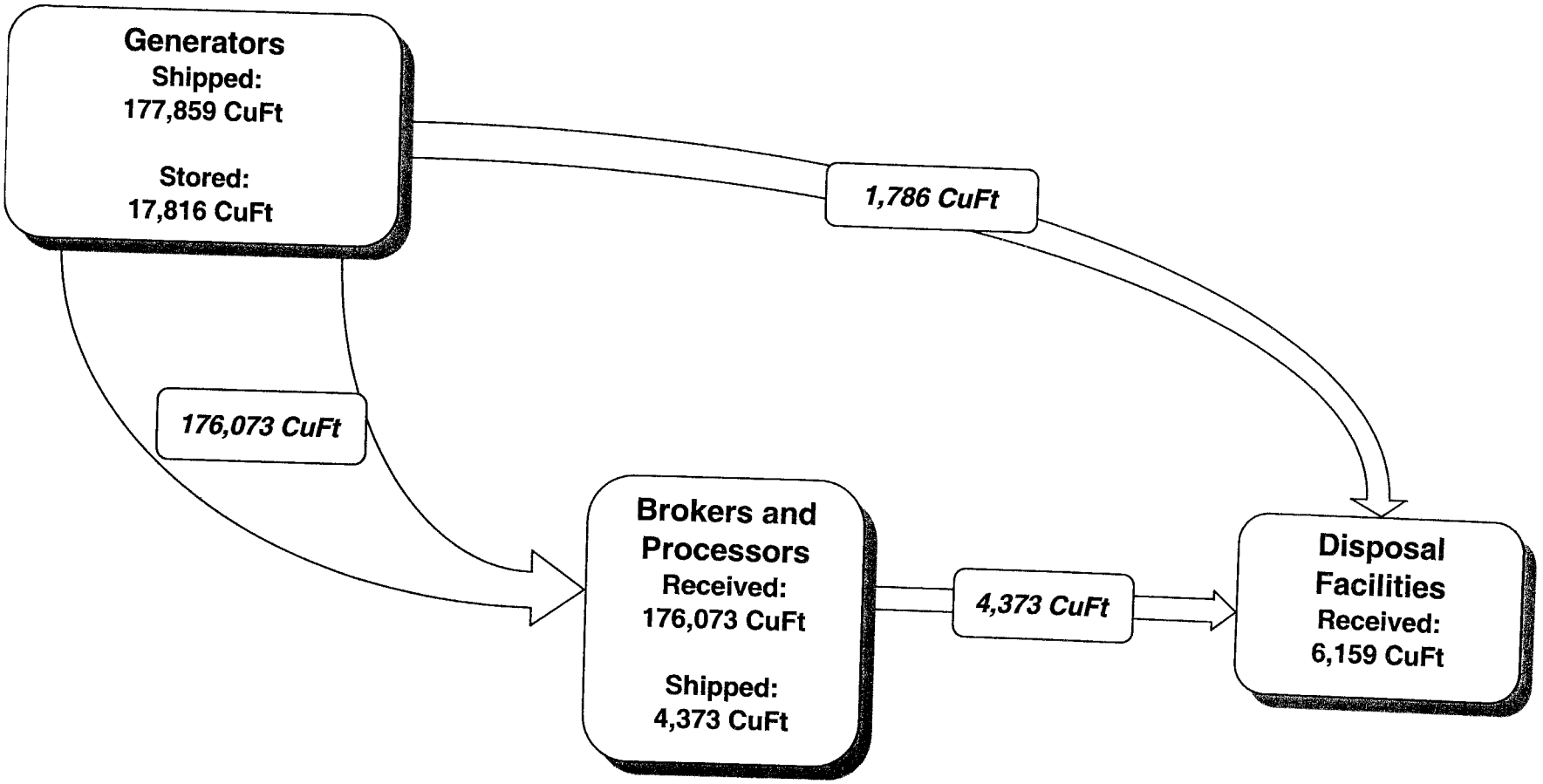

Table 5 and Figure 3 (page 18) illustrate the percentage of volume and radioactivity that was disposed by each category of generator during 1999. Table 6 and Figure 4 (page 19) show the same information for the five-year period from 1995 through 1999. The nuclear power plants continue to be the major source of the volume and activity of waste disposed from Connecticut.

Table 7 (page 20) ranks Connecticut LLRW generators by the amount of waste disposed in 1999. Connecticut Yankee ranked first in volume disposed and Millstone 3 ranked first in radioactivity with Connecticut Yankee a close second.

Table 8 (page 21) ranks the states[20] by the amount disposed in 1999. Connecticut ranked 25th in volume disposed and 18th in activity disposed in 1999.

Figure 5 (page 22) illustrates the volume and radioactivity disposed over the entire period for which such data is available (1979-1999) as well as the amounts projected by LLRW generators for the next five years (2000-2004).[21] For the past 7 years, Connecticut generators have generated and disposed substantially lower amounts of LLRW than in the previous 14 years. The primary reasons for the decline are:

1. Improved operating procedures at generators facilities, particularly Northeast Utilities' nuclear power plants, which reduced the actual generation of LLRW (source reduction);

2. Improved volume reduction during off-site processing, which is probably attributable to the large increase in disposal fees at the Barnwell LLRW disposal facility and space constraints for on-site storage;

While the amount of waste from facility operations that is disposed annually is not likely to return to pre-1993 levels, it is very likely that the total amount of LLRW disposed over the next several years will increase as decommissioning activities increase at Connecticut Yankee and Millstone Unit 1. In particular, the amount of radioactivity projected to be disposed in 2000 is much higher than in recent years. Decommissioning of Connecticut Yankee is responsible for 99.4% of the projected amount.

3.4 LLRW Disposal Sites Used

Prior to 1993, three full-service LLRW disposal facilities[22] were operating in the United States: the Barnwell facility in South Carolina operated by Chem-Nuclear Systems, LLC[23], the Beatty facility in Nevada and the Richland facility in Washington, both operated by U.S. Ecology, Inc. The State of Nevada closed the Beatty facility at the end of 1992. As permitted by federal law, the State of Washington and the Northwest LLRW Compact allowed only generators in the Northwest and Rocky Mountain LLRW Compact regions to use the Richland facility beginning January 1, 1993. South Carolina and the Southeast LLRW Compact allowed generators in most of the country to use the Barnwell facility through June, 1994, after which time the facility was closed to generators outside the Southeast Compact region.

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[20] For purposes of federal LLRW law, the District of Columbia and Puerto Rico are treated as states.

[21] The high amounts of radioactivity disposed in 1984, 1985, 1988 and 1990 are due to disposal of reactor components and control rod blades from the nuclear power plants.

[22] A full-service disposal facility is one that disposes of Class A, B and C LLRW.

[23] In August, 2000, GTS Duratek completed its purchase of Chem-Nuclear Systems and its Barnwell LLRW disposal facility.

TABLE 7: LLRW Disposed In 1999 - Ranked By Generator

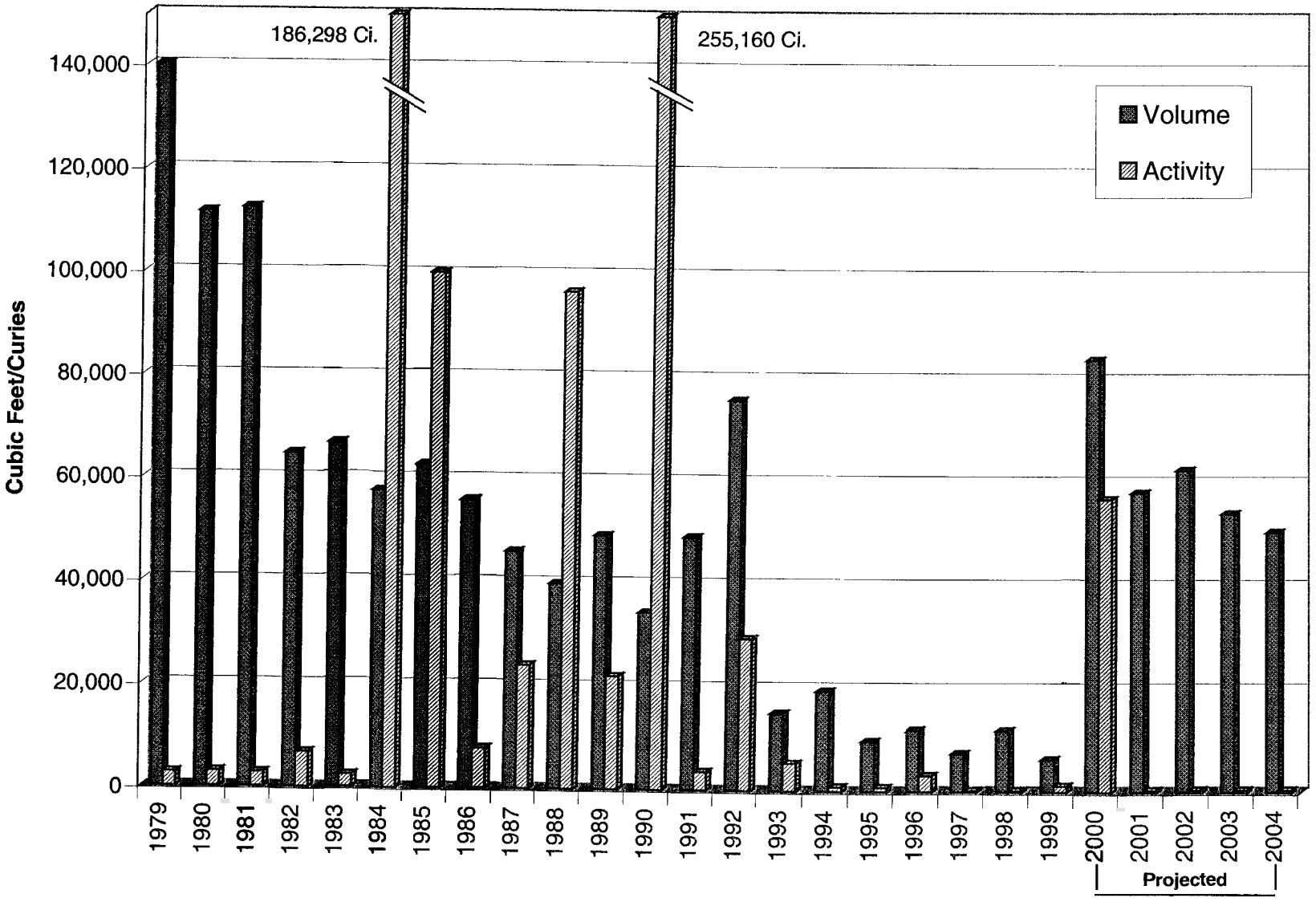
Volume			*Radioactivity*		
Rank	Generator	CuFt	Rank	Generator	Ci
1	Connecticut Yankee Atomic Power Co.	3,059.0	1	Millstone 3 Northeast Nuclear Power Co.	600.456
2	Millstone 3 Northeast Nuclear Power Co.	664.3	2	Connecticut Yankee Atomic Power Co.	542.275
3	U.S. Navy Nuclear Propulsion	534.6	3	U.S. Navy Nuclear Propulsion	18.035
4	Boehringer Ingelheim Pharmaceuticals	333.0	4	Millstone 2 Northeast Nuclear Power Co.	7.184
5	Electric Boat Division, General Dynamics	300.8	5	Boehringer Ingelheim Pharmaceuticals	1.960
6	Millstone 2 Northeast Nuclear Power Co.	291.7	6	Bristol-Myers Squibb	0.428
7	ABB Combustion Engineering Nuclear Services	287.3	7	Millstone 1 Northeast Nuclear Power Co.	0.376
8	Pratt & Whitney Division, United Technologies	279.9	8	ABB Combustion Engineering Nuclear Services	0.299
9	Millstone 1 Northeast Nuclear Power Co.	173.8	9	L&W Research, Inc.	0.138
10	Bayer Corporation	95.1	10	Bayer Corporation	0.052
11	Raytheon Optical Systems, Inc.	35.8	11	University of Connecticut Environ. Health & Safety	0.037
12	University of Connecticut Environ. Health & Safety	32.9	12	Pratt & Whitney Division, United Technologies	0.028
13	University of Connecticut Health Center	24.2	13	University of Connecticut Health Center	0.026
14	Bristol-Myers Squibb	23.4	14	Pfizer Inc.	0.012
15	Electro-Methods Overhaul & Repair	13.2	15	Electro-Methods Overhaul & Repair	0.004
16	Electro-Methods, Inc.	2.4	16	RSA Laboratories, Inc.	0.004
17	L&W Research, Inc.	2.1	17	Uniroyal Chemical Co.	0.002
18	RSA Laboratories, Inc.	2.0	18	Electro-Methods, Inc.	0.001
19	Uniroyal Chemical Co.	1.7	19	Electric Boat Division, General Dynamics	<0.001
20	Sikorsky Aircraft Division, United Technologies	1.1	20	FuelCell Energy Inc.	<0.001
21	FuelCell Energy Inc.	0.7	21	Sikorsky Aircraft Division, United Technologies	<0.001
22	Pfizer Inc.	0.4	22	Raytheon Optical Systems, Inc.	<0.001
	TOTAL	6,159.3		TOTAL	1,171.316

TABLE 8: LLRW Disposed In 1998 - Ranked By State

Volume			Activity		
Rank	State	Cubic Feet	Rank	State	Curies
1	Tennessee	303,475	1	Oregon	1,545,233
2	Pennsylvania	143,307	2	Pennsylvania	86,615
3	Texas	134,125	3	Michigan	79,880
4	Oregon	89,146	4	Illinois	70,345
5	Ohio	75,512	5	Virginia	33,803
6	Michigan	73,638	6	Mississippi	22,881
7	Virginia	40,516	7	New York	6,447
8	New York	34,345	8	Washington	4,336
9	California	33,093	9	Missouri	3,924
10	Washington	29,960	10	New Jersey	3,530
11	North Carolina	29,652	11	Texas	2,348
12	Illinois	26,840	12	Georgia	1,952
13	Massachusetts	23,395	13	Massachusetts	1,795
14	Georgia	19,072	14	Iowa	1,722
15	South Carolina	12,617	15	Louisiana	1,493
16	Maine	12,555	16	Maryland	1,335
17	New Jersey	11,139	17	Tennessee	1,235
18	Utah	10,071	**18**	**Connecticut**	**1,171**
19	Louisiana	9,009	19	Florida	1,085
20	Florida	8,929	20	Nebraska	930
21	Missouri	8,703	21	Alabama	817
22	Maryland	8,475	22	California	798
23	Alabama	7,547	23	South Carolina	738
24	Vermont	6,859	24	Wisconsin	442
25	**Connecticut**	**6,159**	25	Ohio	402
26	Arizona	3,788	26	Vermont	293
27	Nebraska	3,628	27	Arizona	204
28	Kentucky	3,105	28	Maine	202
29	Wisconsin	2,689	29	New Hampshire	156
30	Kansas	2,505	30	Minnesota	128
31	Mississippi	2,428	31	Hawaii	91
32	New Mexico	2,389	32	Colorado	90
33	Colorado	2,332	33	Indiana	65
34	Hawaii	2,303	34	Kansas	65
35	Minnesota	1,841	35	Rhode Island	60
36	Iowa	1,532	36	Montana	43
37	Arkansas	1,452	37	North Carolina	28
38	New Hampshire	1,134	38	Wyoming	14
39	Indiana	707	39	Arkansas	12
40	Oklahoma	497	40	Nevada	8
41	District of Columbia	302	41	District of Columbia	5
42	Montana	161	42	Kentucky	4
43	West Virginia	159	43	Alaska	4
44	Nevada	104	44	Utah	2
45	Delaware	81	45	New Mexico	1
46	Wyoming	70	46	West Virginia	<1
47	Alaska	59	46	Oklahoma	<1
48	Rhode Island	50	48	Puerto Rico	<1
49	North Dakota	14	48	Delaware	<1
50	Puerto Rico	14	50	North Dakota	<1
51	Idaho	13	50	Idaho	<1
52	South Dakota	0	52	South Dakota	0
	Total	1,191,498		Total	1,876,731

Source: National LLW Management Program, August 2000

FIGURE 5: LLRW Disposed And Projected To Be Disposed - 1979-2004



In 1995, South Carolina enacted legislation that withdrew South Carolina from the Southeast LLRW Compact and re-opened the Barnwell facility to LLRW from outside the Southeast Compact region effective July 1, 1995. South Carolina imposed additional surcharges for the right to dispose LLRW at Barnwell and collected substantial revenues for public education.

The Barnwell facility is the only full-service LLRW disposal facility currently available to Connecticut generators and, since South Carolina has joined Connecticut and New Jersey in the Atlantic LLRW Compact with the Barnwell facility as the compact's disposal facility, it is expected that it will remain available to Connecticut generators for years to come. Connecticut generators, however, are not obligated to ship their waste to the Barnwell facility. They are free to ship their waste to other facilities.

Some naturally-occurring radioactive material (NORM) was shipped to the Richland, Washington facility. The federal LLRW legislation does not cover NORM waste. Therefore, the Northwest LLRW Compact's exclusionary authority over shipments of waste to the Richland facility does not cover NORM waste and the facility must accept such waste that meets its license conditions. The Barnwell facility does not accept NORM waste at all.

Envirocare of Utah began disposing of limited types of LLRW at its facility in Clive, Utah, in 1991. The facility was developed outside of the LLRW compact system and is not a regional disposal facility.[24] Actions in 1998 by the State of Utah and the Northwest LLRW Compact expanded the types of waste Envirocare can dispose of at its facility to include almost all types of Class A LLRW. Envirocare has applied to the State of Utah to be allowed to dispose of Class B and Class C LLRW in addition to Class A waste. A final decision of the application is not expected until 2001.

Table 9 and Figure 6 (page 24) show the percentage of volume and radioactivity that was disposed at each of the disposal facilities by Connecticut LLRW generators in 1999. Table 10 and Figure 7 (page 25) show the same information for the five-year period from 1995 through 1999.

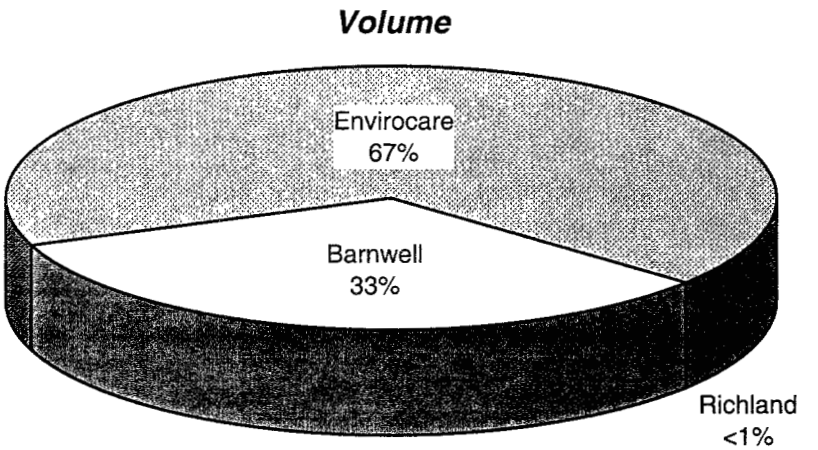
In the 1995-1999 period, most of the volume of LLRW went to the Barnwell facility. However, in 1998 and 1999 most of the volume went to the Envirocare facility. It remains to be seen whether or not South Carolina's admittance to the Atlantic LLRW Compact will have a significant impact on the amount of waste that goes to Barnwell vis-à-vis the Envirocare facility. Practically all of the radioactivity has gone to the Barnwell facility.

[24] While Utah is a member of the Northwest LLRW Compact, the Envirocare facility is not a regional facility for the Northwest Compact (the Richland, Washington facility is the regional facility) and it is free to accept LLRW from any state or compact that approves the export of waste to it.

TABLE 9: LLRW Disposed In 1999 - By Disposal Facility

Disposal Facility	Volume		Activity	
	Cubic Feet	Percentage	Curies	Percentage
Barnwell, SC	2,043.3	33.2%	1,166.166	99.6%
Envirocare, Clive, UT	4,108.2	66.7%	5.124	0.4%
Richland, WA	7.9	0.1%	0.026	<0.1%
TOTAL	6,159.3	100.0%	1,171.316	100.0%

FIGURE 6: LLRW Disposed In 1999 - By Disposal Facility



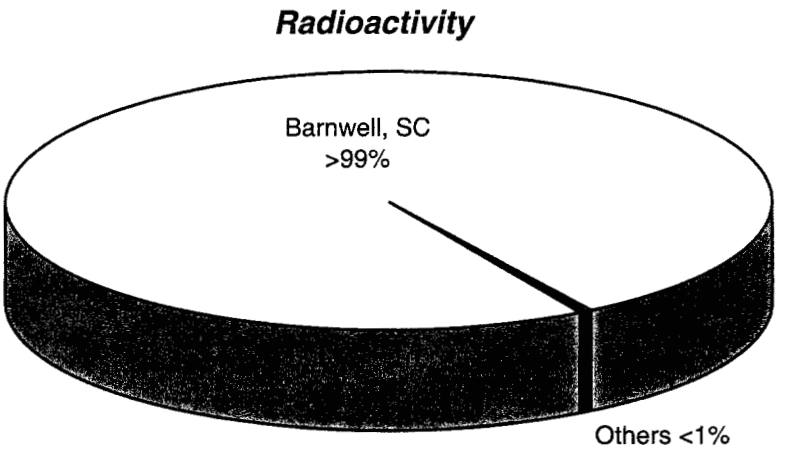
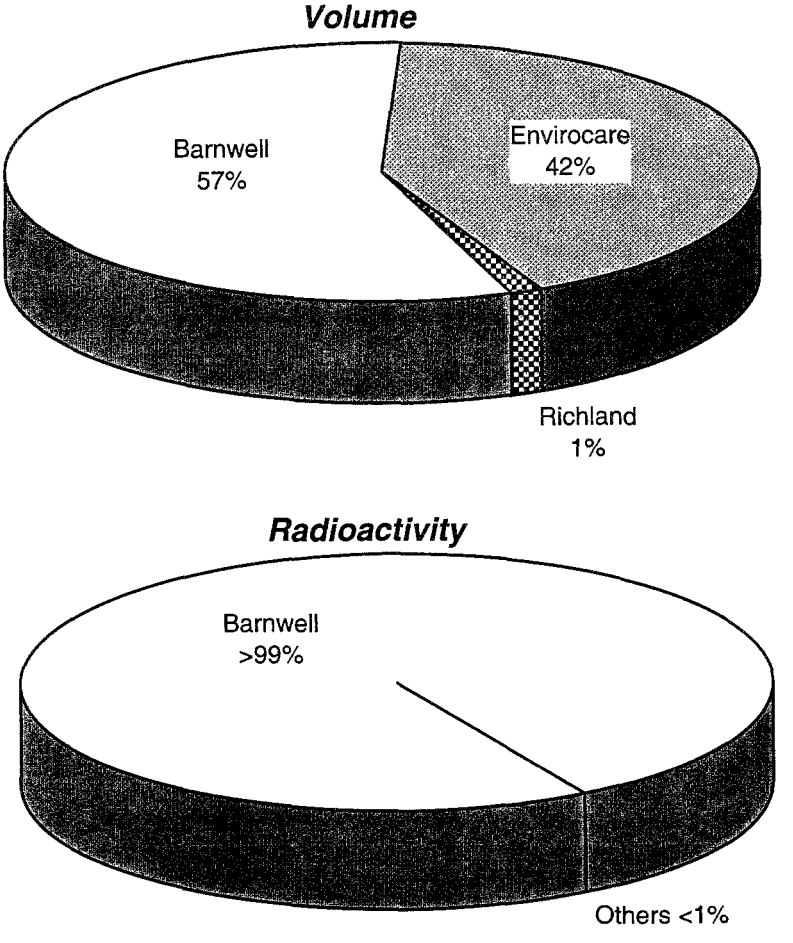


TABLE 10: LLRW Disposed From 1995 To 1999 - By Disposal Facility

Year	Volume (CuFt)				Activity (Ci)			
	Barnwell	Envirocare	Richland	TOTAL Volume	Barnwell	Envirocare	Richland	TOTAL Activity
1995	6,213.9	3,500.0	0.0	9,713.9	839.52	0.20	0.00	839.71
1996	10,869.9	900.0	0.0	11,769.9	3,087.89	0.04	0.00	3,087.93
1997	3,880.2	2,732.2	658.4	7,270.8	258.06	0.52	0.00	258.58
1998	3,277.7	8,366.1	19.7	11,663.5	256.48	1.02	<0.01	257.50
1999	2,043.3	4,108.2	7.9	6,159.3	1,166.17	5.12	<0.01	1,171.32
TOTAL	26,285.0	19,606.5	686.0	46,577.4	5,608.11	6.90	<0.01	5,615.03
Percentage	56.4%	42.1%	1.5%	100.0%	99.9%	<0.1%	<0.1%	100.0%

FIGURE 7: LLRW Disposed From 1995 To 1999 - By Disposal Facility



4. Characterization Of LLRW Shipped From Connecticut During 1998

In addition to generator category, volume and activity, Connecticut's LLRW can be described according to several other characteristics, including NRC waste class, waste stream and radionuclide content.

4.1 NRC Waste Class

The NRC classification system for LLRW is designed to take into account the potential hazards of LLRW in a disposal facility. The system is based on the concentration of particular radionuclides in the waste and is part of an overall regulatory system designed to control the potential human exposure to disposed waste. The classes of LLRW are:

- Class A waste, which generally consists of short-lived radionuclides (radioactive half-lives of less than 30 years), but also includes low concentrations of some long-lived radionuclides;[25]
- Class B waste, which includes waste with higher concentrations of short-lived radionuclides than Class A waste and concentrations of long-lived radionuclides similar to Class A waste;[26] and
- Class C waste, which includes waste with the highest concentrations of short-lived and long-lived radionuclides that states are responsible for managing.[27] [28]

Table 11 (page 27) shows, by generator, the radioactivity and volume of the three classes of LLRW shipped for disposal from Connecticut in 1999. The four nuclear power plants generate most of the Class B and C waste generated in Connecticut. Other generators have disposed an assortment of items, including sealed calibration and measurement sources and tritium-bearing glow-in-the-dark devices and exit signs that meet the definition of Class B and Class C waste.

Table 12 and Figure 8 (page 28) show the proportions, by waste class, of the LLRW shipped to disposal facilities in 1999. Table 13 and Figure 9 (page 29) show the same information for the five-year period 1995 through 1999. For 1999, most of the volume disposed was Class A waste while most of the radioactivity was in Class C waste. For 1995 through 1999, most of the volume was Class A waste, but most of the radioactivity was in Class B waste rather than in Class C waste. This is, in part, due to very large shipments of Class B waste by the U.S. Army Connecticut National Guard in 1996.

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[25] Disposal of Class A waste must isolate the waste for at least 100 years.

[26] Class B waste must be in a structurally stable physical form for disposal or in a structurally stable container that will last for a minimum of 300 years.

[27] Disposal units for Class C LLRW must have barriers capable of preventing people in the future from accidentally encountering the waste for at least 500 years

[28] There is a fourth class of LLRW called "Greater than Class C", but the federal government, not the states, is responsible for its management. "Greater than Class C" LLRW is waste that exceeds the concentrations for Class C waste. It is not acceptable for disposal in LLRW disposal facilities. The primary source of "greater than Class C" waste will be the decommissioning of nuclear power plants. Federal law specifies that the U.S. Department of Energy is responsible for the management of "greater than Class C" LLRW.

TABLE 11: Waste Classes Of LLRW Disposed In 1999 - By Generator

Generator	Volume (CuFt)	Activity (Ci)
CLASS A		
ABB Combustion Engineering Nuclear Services	287.3	0.299
Bayer Corporation	95.1	0.052
Boehringer Ingelheim Pharmaceuticals	333.0	1.960
Bristol-Myers Squibb	23.4	0.428
Connecticut Yankee Atomic Power Co.	2,217.0	1.436
Electric Boat Division, General Dynamics	300.9	<0.001
Electro-Methods Overhaul & Repair	13.2	0.004
Electro-Methods, Inc.	2.4	0.001
FuelCell Energy Inc.	0.7	<0.001
L&W Research, Inc.	2.1	0.138
Millstone 1 Northeast Nuclear Power Co.	173.7	0.376
Millstone 2 Northeast Nuclear Power Co.	291.3	0.344
Millstone 3 Northeast Nuclear Power Co.	543.2	0.746
Pfizer Inc.	0.4	0.012
Pratt & Whitney Division, United Technologies	279.9	0.028
Raytheon Optical Systems, Inc.	35.8	<0.001
RSA Laboratories, Inc.	2.0	0.004
U.S. Navy Nuclear Propulsion	534.6	18.035
Uniroyal Chemical Co.	1.7	0.002
University of Connecticut Environ. Health & Safety	32.9	0.037
University of Connecticut Health Center	24.2	0.026
CLASS A TOTAL	5,194.7	23.927
CLASS B		
Millstone 1 Northeast Nuclear Power Co.	0.1	<0.001
Millstone 2 Northeast Nuclear Power Co.	0.4	6.840
Millstone 3 Northeast Nuclear Power Co.	0.8	36.900
CLASS B TOTAL	1.3	43.740
CLASS C		
Connecticut Yankee Atomic Power Co.	842.0	540.839
Millstone 3 Northeast Nuclear Power Co.	120.3	562.811
Sikorsky Aircraft Division, United Technologies	1.1	<0.001
CLASS C TOTAL	963.4	1,103.650
TOTAL	6,159.3	1,171.317

TABLE 12: LLRW Disposed In 1999 - By Waste Class

Waste Class	Volume		Activity	
	Cubic Feet	Percentage	Curies	Percentage
Class A	5,194.7	84.3%	23.927	2.0%
Class B	1.3	<0.1%	43.740	3.7%
Class C	963.4	15.6%	1,103.650	94.2%
TOTAL	6,159.3	100.0%	1,171.317	100.0%

FIGURE 8: LLRW Disposed In 1999 - By Waste Class

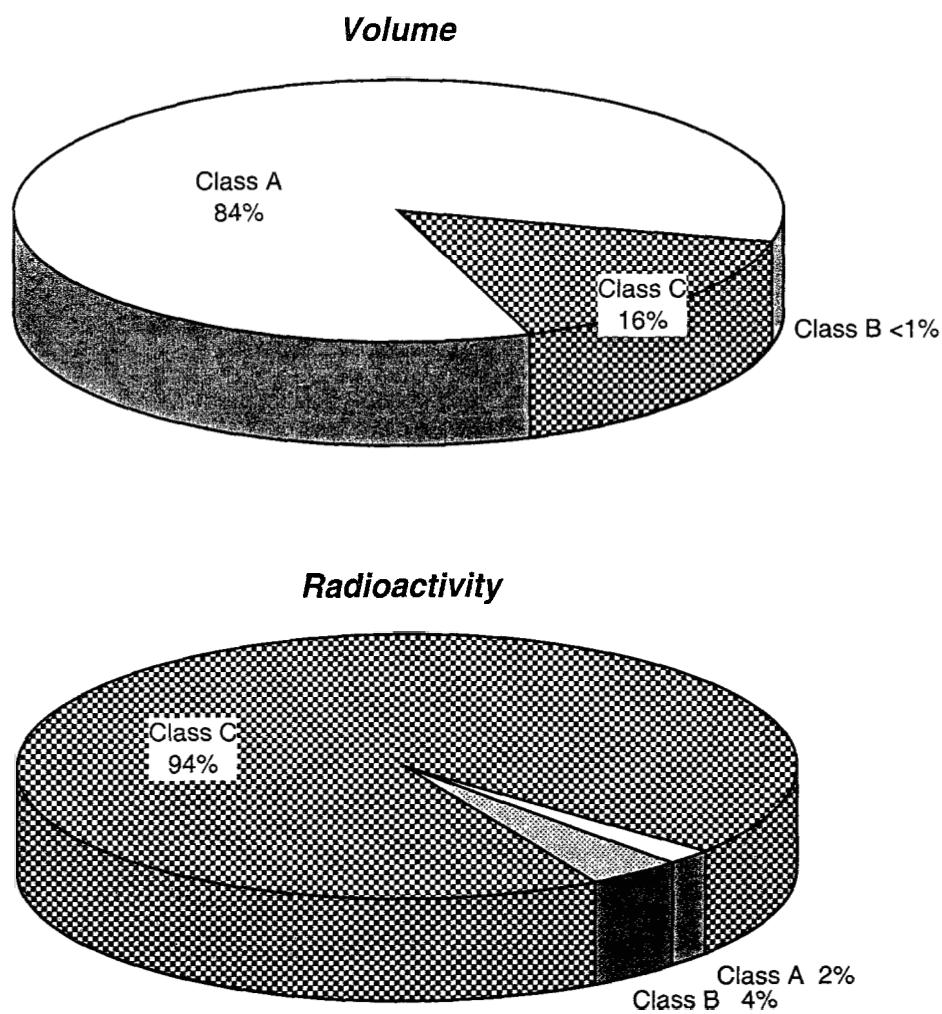
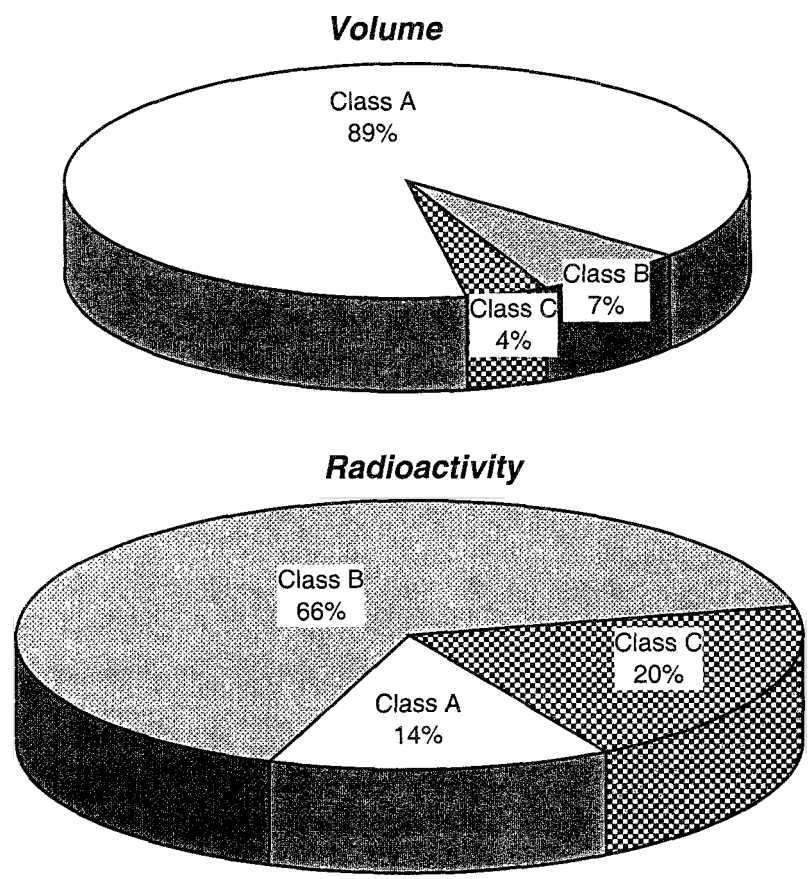


TABLE 13: LLRW Disposed From 1995 To 1999 - By Waste Class

Year	Volume (CuFt)				Activity (Ci)			
	Class A	Class B	Class C	TOTAL Volume	Class A	Class B	Class C	TOTAL Activity
1994	17,922.5	800.5	614.9	19,337.9	254.95	513.57	119.29	887.82
1995	8,976.6	617.0	120.3	9,713.9	201.84	599.71	38.17	839.71
1996	8,771.9	1,914.7	1,083.3	11,769.9	276.08	1,943.80	868.05	3,087.93
1997	6,440.7	662.1	168.0	7,270.8	15.19	227.77	15.62	258.58
1998	10,947.7	303.7	412.1	11,663.5	12.74	224.44	20.33	257.50
1999	5,194.7	1.3	963.4	6,159.3	23.93	43.74	1,103.65	1,171.32
TOTAL	53,059.4	4,298.0	2,398.6	59,756.0	760.80	3,509.29	1,061.45	5,331.54
Percentage	88.8%	7.2%	4.0%	100.0%	14.3%	65.8%	19.9%	100.0%

FIGURE 9: LLRW Disposed From 1995 To 1999 - By Waste Class



4.2 Waste Streams

Waste streams are the various types of LLRW classified according to generator category, physical characteristics of the waste and the process by which they were created.

Table 14 (page 31) lists the waste streams disposed by Connecticut generators in 1999 and the volume and activity of each waste stream. The table also includes a description of each waste stream.

4.3 Radionuclide Content And Radioactive Decay

Table 15 (pages 32 and 33) lists by atomic weight the radionuclides in LLRW shipped off-site for management by all Connecticut generators in 1999. For each radionuclide, the table indicates its half-life[29] in years and, by category of generator, the amount of the radionuclide shipped off-site for management. The predominant radionuclide in the waste is Iron-55 (half-life of 2.7 years) which accounted for 43.5% of the radioactivity. It was followed by Cobalt-60 (5.3 years; 17.5%), Cesium-137 (30.2 years; 16.4%) and Nickel-63 (100 years; 16.2%).

Figure 10 (page 34) describes Connecticut LLRW shipped off-site in 1999 and depicts the amount of remaining radioactivity at various times in the future as a result of radioactive decay. In-growth and decay of progeny radionuclides is included. The amount of radioactivity left after 100 years is 148.1 curies, 12% of the original 1,214.4 curies. After 500 years, the amount remaining is approximately 15.5 curies, 1.3% of the original amount.

5. LLRW Projections

Table 16 (pages 36 and 37) presents projections made by LLRW generators of the amounts of waste requiring disposal that they would generate over each of the next five years. With the exception of Connecticut Yankee, the amounts projected over the next five years are very similar to the amounts disposed the last two years. The amount projected for Connecticut Yankee is for decommissioning the facility.

[29] "Half-life" is the length of time it takes for the amount of a particular radionuclide to be reduced, through radioactive decay, to one-half of its initial value. Each radionuclide has a specific, measurable half-life.

TABLE 14: LLRW Disposed In 1999 - By Waste Stream

Waste Stream	Description	Class A Volume (CuFt)	Class A Activity (Ci)	Class B Volume (CuFt)	Class B Activity (Ci)	Class C Volume (CuFt)	Class C Activity (Ci)
INDUSTRIAL							
N-LOTRASH	Low Activity Trash	569.2	0.331				
N-LOWASTE	Low Activity Waste	49.7	0.004				
N-NARM	Naturally-Occurring Radioactive Material	2.4	0.001			1.1	<0.001
INDUSTRIAL TOTAL		621.3	0.336	0.0	0.000	1.1	<0.001
INSTITUTIONAL							
I-COTRASH	Combustible/Compactible Trash	25.0	0.011	20.0	0.008		
I-MISCSOR	Miscellaneous Sealed Sources & Devices	3.3	0.018				
[illegible]	Naturally-Occurring Radioactive Material	8.8	0.026				
INSTITUTIONAL TOTAL		37.1	0.055	20.0	0.008	0.0	0.000
MILITARY							
M-NAVYDRY	Navy Dry Waste	654.2	0.006				
M-NAVYWET	Navy Wet Waste	181.3	18.030				
MILITARY TOTAL		835.5	18.036	0.0	0.000	0.0	0.000
NUCLEAR POWER PLANT							
B-COTRASH	BWR Combustible/Compactible Trash	19.9	0.028	0.1	<0.001		
B-NCTRASH	BWR Noncombustible/Compactible Trash	153.8	0.348				
O-METDCON	Metal Sent For Decontamination	224.4	0.144				
O-MISCLNS	Misc. Non-Hazardous Oils, Sludges, Etc.	44.5	0.029				
P-COTRASH	PWR Combustible/Compactible Trash	1,484.0	1.565	0.1	<0.001		
P-FCARTRG	PWR Caratridge Filters					120.3	562.811
P-IXRESIN	PWR Ion-Exchange Resins			1.2	43.740	842.0	540.839
P-NCTRASH	PWR Noncombustible/Compactible Trash	1,298.6	0.788				
NUCLEAR POWER PLANT TOTAL		3,225.2	2.901	1.3	43.740	962.3	1,103.650
PRIVATE RESEARCH							
I-AQULIQD	Absorbed Liquids	40.0	0.066				
I-BIOWAST	Biological Waste	29.9	0.011				
I-COTRASH	Combustible/Compactible Trash	381.2	2.374				
I-NARM	Naturally-Occurring Radioactive Material	2.1	0.138				
I-NCTRASH	Noncombustible/Noncompactible Trash	2.5	0.002				
PRIVATE RESEARCH TOTAL		455.7	2.591	0.0	0.000	0.0	0.000
TOTAL		5,174.7	23.919	21.3	43.748	963.4	1,103.650

TABLE 15: Radionuclides In LLRW Shipped Off-Site For Management in 1999 - By Category Of Generator

Radionuclide		Half-Life (Years)	Industrial (Ci)	Insti-tutional (Ci)	Military (Ci)	Nuclear Power Plant (Ci)	Private Research (Ci)	TOTAL (Ci)
H-3	Tritium	12.3	0.025	3.250	0.001	0.095	7.029	10.399
C-14	Carbon	5,715.	<0.001	0.038	0.119	1.078	7.188	8.424
Na-22	Sodium	2.6		0.005			<0.001	0.005
P-32	Phosphorus	0.04		0.003		0.003	0.212	0.218
P-33	Phosphorus	0.07		<0.001		<0.001	0.066	0.066
S-35	Sulfur	0.24		0.094		0.004	0.668	0.766
Cl-36	Chlorine	301,000.		0.002			<0.001	0.002
K-40	Potassium	1,260,000,000.	<0.001					<0.001
Ca-45	Calcium	0.45		0.009				0.009
Sc-46	Scandium	0.23		<0.001				<0.001
Cr-51	Chromium	0.08		0.001		0.056	0.013	0.070
Mn-54	Manganese	0.86	0.001	<0.001	0.398	9.384		9.784
Fe-55	Iron	2.7	0.001	0.002	7.961	520.630		528.594
Fe-59	Iron	0.12				<0.001		<0.001
Co-57	Cobalt	0.74		0.102		0.072		0.173
Co-58	Cobalt	0.19	0.003		0.796	0.135		0.934
Co-60	Cobalt	5.3	0.032	0.005	7.961	204.687		212.685
Ni-63	Nickel	100.	<0.001	0.038	0.637	196.736		197.411
Zn-65	Zinc	0.67		0.001	0.239	0.046		0.286
As-73	Arsenic	0.22		<0.001				<0.001
Rb-86	Rubidium	0.05		<0.001				<0.001
Sr-85	Strontium	0.18		<0.001				<0.001
Sr-89	Strontium	0.14		<0.001		0.002		0.002
Sr-90	Strontium	29.1	<0.001	0.292	0.004	1.606		1.902
Zr-95	Zirconium	0.18	0.004			0.004		0.008
Nb-95	Niobium	0.1		<0.001		<0.001		<0.001
Tc-99	Technetium	213,000.		<0.001	<0.001	0.050		0.050
Ru-103	Ruthenium	0.11		<0.001				<0.001
Ag-110m	Silver	0.68				0.123		0.123
In-111	Indium	<0.01		<0.001		<0.001		<0.001
In-114m	Indium	0.14		<0.001				<0.001
Sn-113	Tin	0.32		0.006		<0.001		0.006
Sn-119m	Tin	0.8		0.015				0.015
Sb-125	Antimony	2.8	0.002	0.001		2.724		2.727
I-125	Iodine	0.16		0.001		<0.001	0.175	0.176
I-129	Iodine	17,000,000.		<0.001	<0.001	0.005		0.005
I-131	Iodine	0.02				<0.001	0.003	0.003

TABLE 15: (Continued)

Radionuclide		Half-Life (Years)	Industrial (Ci)	Insti-tutional (Ci)	Military (Ci)	Nuclear Power Plant (Ci)	Private Research (Ci)	TOTAL (Ci)
Cs-134	Cesium	2.1	<0.001			33.522		33.522
Cs-137	Cesium	30.2	<0.001	0.005	0.004	198.800		198.810
Ba-133	Barium	10.5		<0.001				<0.001
Ce-141	Cerium	0.09		<0.001				<0.001
Ce-144	Cerium	0.78		<0.001		2.160		2.160
Pm-147	Promethium	2.62		<0.001				<0.001
Sm-151	Samarium	90.		0.082				0.082
Sm-153	Samarium	<0.01					<0.001	<0.001
Gd-153	Gadolinium	0.66		<0.001				<0.001
Tl-204	Thallium	3.78		<0.001				<0.001
Tl-208	Thallium	0.25	<0.001					<0.001
Pb-210	Lead	22.3		<0.001				<0.001
Pb-212	Lead	<0.01		<0.001				<0.001
Po-210	Polonium	0.38		<0.001				<0.001
Bi-207	Bismuth	35.		<0.001				<0.001
Ra-226	Radium	1,599.		0.026		<0.001		0.026
Th-228	Thorium	1.91		<0.001				<0.001
Th-232	Thorium	14,000,000,000.	0.037	<0.001	0.001			0.038
U-234	Uranium	245,000.				<0.001		<0.001
U-235	Uranium	704,000,000.		<0.001		<0.001		<0.001
U-238	Uranium	4,460,000,000.	<0.001	0.013		<0.001	0.138	0.151
Np-237	Neptunium	2,140,000.				<0.001		<0.001
Pu-238	Plutonium	87.7				0.249		0.249
Pu-239	Plutonium	24,110.		<0.001		0.080		0.080
Pu-241	Plutonium	14.4				4.027		4.027
Pu-242	Plutonium	376,000.				<0.001		<0.001
Am-241	Americium	432.2	<0.001	<0.001	<0.001	0.281		0.281
Cm-242	Curium	0.45	<0.001			0.003		0.003
Cm-243	Curium	28.5				0.107		0.107
Cm-244	Curium	18.1	<0.001			0.007		0.007
	Unspecified							0.009
TOTAL			0.106	3.992	18.120	1,176.676	15.493	1,214.396

FIGURE 10: Decay Of LLRW Shipped Off-Site For Management - 1999

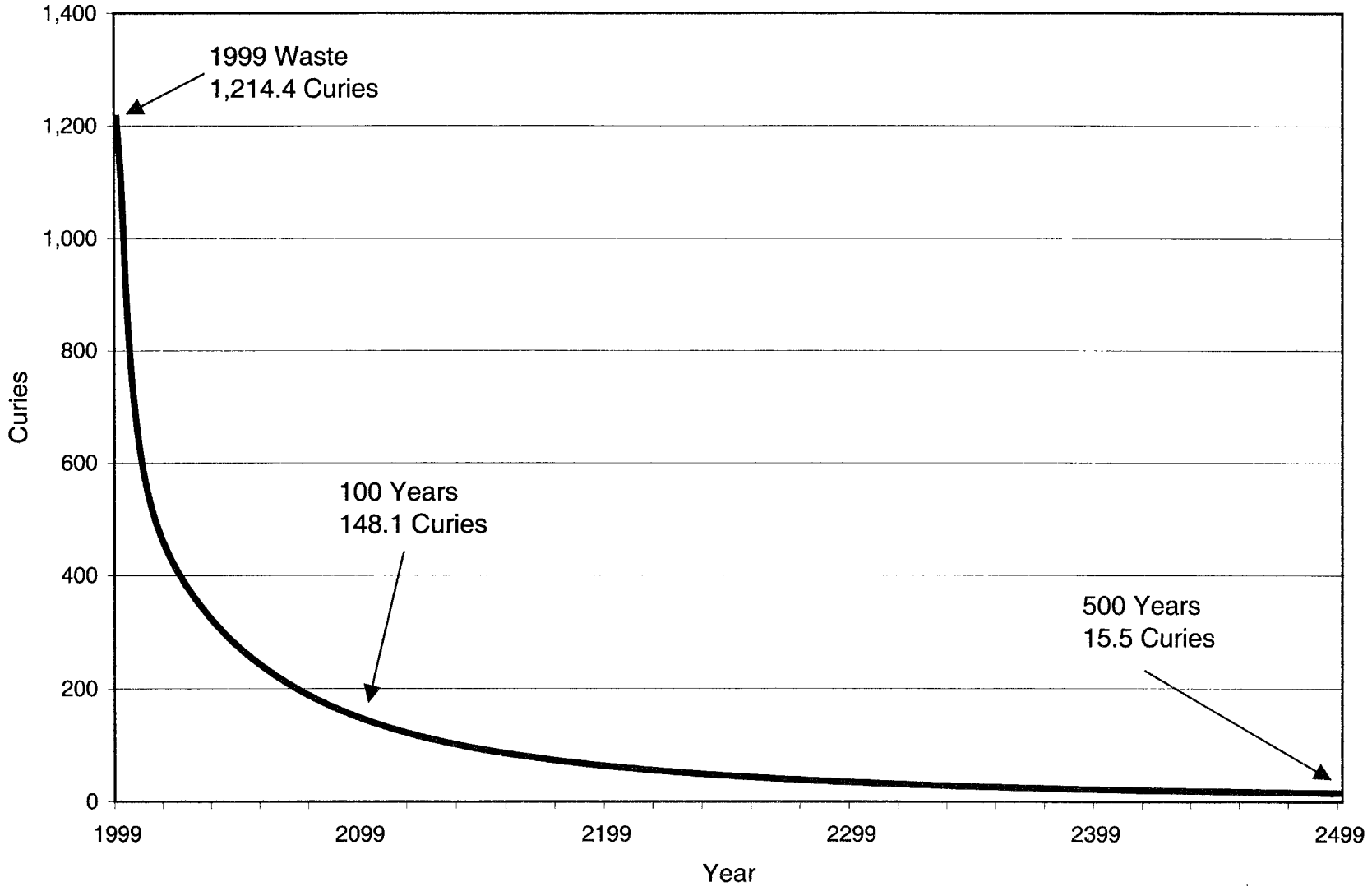


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TABLE 16: Generator Projections Of Amount Of LLRW To Be Disposed - 2000-2004

Generator	2000		2001		2002		2003		2004		TOTAL	
	Volume (CuFt)	Activity (Ci)	Volume (CuFt)	Activity (Ci)	Volume (CuFt)	Activity (Ci)	Volume (CuFt)	Activity (Ci)	Volume (CuFt)	Activity (Ci)	Volume (CuFt)	Activity (Ci)
ABB Combustion Engineering Nuclear Products							2,179	<0.1			2,179	0.0
ABB Combustion Engineering Nuclear Services	200	0.2	200	0.2	200	0.2	200	0.2	200	0.2	1,000	1.0
Alexion Pharmaceuticals	4	<0.1	4	<0.1	4	<0.1	4	<0.1	4	<0.1	20	0.0
Alpha Q, Inc.	10	<0.1	10	<0.1	10	<0.1	10	<0.1	10	<0.1	50	0.0
Arch Chemicals, Inc.	5	<0.1									5	0.0
Bayer Corporation	50	<0.1	58	<0.1	66	0.1	74	0.1	82	0.1	330	0.3
Boehringer Ingelheim Pharmaceuticals	200	2.0	210	2.1	220	2.2	235	2.3	240	2.4	1,105	11.1
Bristol-Myers Squibb	25	0.5	25	0.5	25	0.5	25	0.5	25	0.5	125	2.5
Budney Overhaul & Repair Ltd.	190	<0.1	190	<0.1	190	<0.1	190	<0.1	190	<0.1	950	0.0
Clairol	15	<0.1	15	<0.1	15	<0.1	15	<0.1	15	<0.1	75	0.0
Connecticut Agricultural Experiment Station	1	<0.1	1	<0.1	1	<0.1	1	<0.1	1	<0.1	5	0.0
Connecticut College	1	<0.1	1	<0.1	1	<0.1	1	<0.1	1	<0.1	5	0.0
Connecticut Yankee Atomic Power Co.	58,071	56,276.9	28,361	5.3	12,100	1.8	1,411	0.1			99,943	56,284.1
DeKalb Genetics Corp.	10	<0.1	10	<0.1	10	<0.1	10	<0.1	10	<0.1	50	0.0
Diagnostic Radiology Associates	12	<0.1									12	0.0
Eastern Connecticut State University	<1	<0.1	<1	<0.1	<1	<0.1	<1	<0.1	<1	<0.1	2	0.0
Electric Boat Division, General Dynamics	300	<0.1	100	<0.1	100	<0.1	100	<0.1	100	<0.1	700	0.0
Fischer Technology Inc.	1	<0.1	1	<0.1	1	<0.1	<1	<0.1	<1	<0.1	2	0.1
Hamilton Sundstrand Division, United Technologies	<1	0.4									0	0.4
Honeywell Stratford Army Engine Plant	228	<0.1									228	0.0
Institutes for Pharmaceutical Discovery, Inc.	1	<0.1	1	<0.1	1	<0.1	1	<0.1	1	<0.1	5	0.0
John B. Pierce Laboratory	5	<0.1	5	<0.1	5	<0.1	5	<0.1	5	<0.1	25	0.0
Kodak S.I.S.	8	<0.1									8	0.0
Millstone 1 Northeast Nuclear Power Co.	21,048	150.4	21,047	209.6	46,141	317.2	46,141	317.2	46,141	317.2	180,518	1,311.6
Millstone 2 Northeast Nuclear Power Co.	700	9.1	700	9.1	700	9.1	700	9.1	700	9.1	3,500	45.5
Millstone 3 Northeast Nuclear Power Co.	700	9.1	700	9.1	700	9.1	700	9.1	700	9.1	3,500	45.5
Neurogen Corporation	400	0.1	400	0.1	400	0.1	400	0.1	400	0.1	2,000	0.3
ONSI	1	<0.1	1	<0.1	1	<0.1	1	<0.1	1	<0.1	3	0.0

TABLE 16: (Continued)

Generator	2000		2001		2002		2003		2004		TOTAL	
	Volume (CuFt)	Activity (Ci)	Volume (CuFt)	Activity (Ci)	Volume (CuFt)	Activity (Ci)	Volume (CuFt)	Activity (Ci)	Volume (CuFt)	Activity (Ci)	Volume (CuFt)	Activity (Ci)
Oread, Inc.	75	0.2	75	0.2	75	0.2	75	0.2	75	0.2	375	0.9
Packard BioScience Company	12	<0.1			8	<0.1			8	<0.1	28	0.0
Pfizer Inc.	12	0.3	14	0.4	16	0.5	18	0.5	21	0.6	81	2.3
Pratt & Whitney Division, United Technologies	100	<0.1	10	<0.1							110	0.0
Raytheon Optical Systems, Inc.	70	<0.1	70	<0.1	70	<0.1	70	<0.1	70	<0.1	350	0.0
RSA Laboratories, Inc.	2	<0.1	2	<0.1	2	<0.1	2	<0.1	2	<0.1	10	0.0
SibTech, Inc.	10	5.0									10	5.0
Silicon Valley Group	1	<0.1	1	<0.1	1	<0.1	1	<0.1	1	<0.1	5	0.0
Trinity College	2	<0.1	2	<0.1	2	<0.1	2	<0.1	2	<0.1	10	0.0
U.S. Army Connecticut National Guard	8	130.0	8	125.5	8	125.5	8	125.5	8	125.5	38	632.0
U.S. Navy Hospital			10	<0.1			10	<0.1			20	0.0
U.S. Navy Nuclear Propulsion	1,000	1.0	1,000	1.0	1,000	1.0	1,000	1.0	1,000	1.0	5,000	5.0
Uniroyal Chemical Co.	60	0.1	80	0.1	70	0.1	70	0.1	60	0.1	340	0.3
United Technologies Research Center	2	<0.1	2	<0.1	2	<0.1	2	<0.1	2	<0.1	10	0.0
University of Connecticut Environ. Health & Safety	25	0.1	25	0.1	25	0.1	25	0.1	25	0.1	125	0.4
University of Connecticut Health Center	2	<0.1	4	<0.1	5	<0.1	5	<0.1	5	<0.1	21	0.1
VA Connecticut Healthcare System	15	<0.1	15	<0.1	15	<0.1	15	<0.1	15	<0.1	75	0.0
Vion Pharmaceuticals, Inc.	16	<0.1	20	<0.1	28	<0.1	26	<0.1	26	<0.1	117	0.0
Wesleyan University	8	<0.1	8	<0.1	8	<0.1	8	<0.1	8	<0.1	38	0.0
Yale University	100	0.9	4,500	1.2	100	0.9	100	0.9	100	0.9	4,900	4.8
Yale-New Haven Hospital	8	0.3	8	0.3	8	0.3	8	0.3	8	0.3	38	1.5
TOTAL	83,712	56,586.6	57,891	364.8	62,332	468.7	53,847	467.3	50,261	467.3	308,042	58,354.7

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APPENDIX A:

GLOSSARY

GLOSSARY

Class A LLRW – LLRW which generally consists of short-lived radionuclides (radioactive half-lives of less than 30 years), but also includes low concentration of some long-lived radionuclides. Disposal of Class A waste requires isolating the waste for at least 100 years.

Class B LLRW – LLRW which includes waste with higher concentration of short-lived radionuclides than Class A waste and concentration of long-lived radionuclides similar to Class A waste. Class B waste must be in a structurally stable physical form for disposal or in a structurally stable container that will last for a minimum of 300 years.

Class C LLRW – LLRW that includes waste with the highest concentrations of short-lived and long-lived radionuclides that states are responsible for managing. Disposal units for Class C LLRW must have barriers capable of preventing people in the future from accidentally encountering the waste for at least 500 years.

Compact – (1)(noun) A voluntary, Congressionally-approved agreement between states; also, a grouping of states pursuant to the agreement. For the management of LLRW, federal law provides for the formation of multi-state compacts having specific powers and responsibilities. Connecticut, New Jersey and South Carolina have entered into and comprise the Atlantic Interstate LLRW Management Compact, formerly known as the Northeast Interstate LLRW Management Compact. (2)(verb) The act of compressing LLRW into smaller volumes prior to disposal.

Curie – A unit of radioactivity equivalent to 37 billion radioactive disintegrations per second. This is approximately the level of radioactivity contained in one gram of radium-226.

Half-life – The length of time required for the amount of a particular radionuclide to be reduced, through radioactive decay, to one-half of its initial value.

Hazardous Waste – Waste that is listed as hazardous by the U.S. Environmental Protection Agency (EPA) in Title 40, Code of Federal Regulations, Part 261 (40 CFR 261), Subpart D, or that exhibits any of the hazardous waste characteristics identified by the EPA in 40 CFR 261, Subpart C. Hazardous wastes may cause or significantly contribute to mortality or illness, or pose a threat to human health or the environment if improperly managed.

High-Level Radioactive Waste – As defined in federal law, radioactive waste consisting of the residues from reprocessing spent nuclear reactor fuel to recover unfissioned uranium and plutonium, as well as the spend nuclear fuel itself.

Isotopes – Atoms of an element (same atomic number) having different atomic weights due to different numbers of neutrons in the atomic nucleus. Isotopes of a particular element differ in their stability and radioactive decay properties.

Low-Level Radioactive Waste (LLRW) – As defined in federal and state law, radioactive waste other than high-level radioactive waste, spent nuclear fuel assemblies or uranium mining and milling wastes. LLRW includes a wide variety of materials that have a wide range of levels of radioactivity. It includes slightly radioactive items, such as protective clothing, paper towels and laboratory equipment, as well as some very radioactive items, such as materials used to purify reactor coolant in nuclear power plants and used equipment from inside nuclear reactors. LLRW

is generated in the operation and maintenance of nuclear power plants, as well as by many public and private institutions (hospitals and universities), private research firms, industrial facilities and the military.

Millicurie – A unit of radioactivity equivalent to one one-thousandth of a curie, i.e., 37 million radioactive disintegrations per second.

Mixed Waste – Waste material that meets the definitions of both hazardous waste and radioactive waste, e.g., LLRW that is also hazardous waste.

Naturally-Occurring Radioactive Material (NORM) – Radioactive waste that contains radioactive substances found in nature that are not covered under the federal Atomic Energy Act. NORM includes some mining wastes, oil and gas production wastes, water treatment residues, coal ash and discarded radium sources used in medical procedures.

Progeny Radionuclide – A radioactive substance that comes into being as the result of the radioactive decay of another radioactive substance, i.e., the parent radionuclide.

Radiation – Sub-atomic particles and energy emitted by an atomic nucleus during radioactive decay.

Radioactivity – (1) A property of matter by which unstable atomic nuclei spontaneously disintegrate. Through one, several, or a lengthy series of disintegrations, radioactive substances eventually "decay" to stable, non-radioactive substances. (2) A quantitative expression of the rate of decay of a radioactive substance (also "Activity"). As radioactive decay proceeds over time, radioactivity decreases.

Radionuclide/Radioisotope – Radioactive atoms of an element. Not all isotopes of a given element are radioactive.